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Research Highlight

Ice storms and tornadoes were not enough to stop a team from the Pacific Northwest National Laboratory who traveled to Oklahoma in January to begin an aircraft field study on thin clouds.

The researchers are gathering direct measurements from thin, low-lying clouds as part of a field campaign from January to June 2009 that will lead ultimately to more accurate climate change predictions. The campaign is part of the U.S. Department of Energy's Atmospheric Radiation Measurement Program, a multilaboratory program that has been making important contributions to global climate change research for two decades.

The field campaign, known as RACORO, is the first long-term aircraft campaign to conduct systematic sampling of cloud properties from the air.

Clouds contain different amounts of water and ice, which affect their opacity and make them appear either thick or thin. These characteristics directly affect how much sunlight the cloud transmits to Earth or reflects back into space. This energy feedback process is a key component of climate.

Low-level, thin clouds are often tenuous and scattered, which makes their properties—such as water content and water droplet size—hard to measure accurately with ground-based or satellite instruments. Scientists rely on these measurements as input to climate models, and because these cloud types occur all over the globe, it's important that the models have accurate data.

With several flights each week through June 2009, researchers are obtaining data about clouds that reside up to 3.6 kilometers (12,000 feet) from the Earth's surface. Equipped with a comprehensive set of probes and sensors to measure solar and thermal radiation, cloud microphysics, aerosol properties, and atmospheric state, a Twin Otter aircraft flies over the ARM Climate Research Facility site near Lamont, Oklahoma. This heavily-instrumented research site, established in 1994, operates continuously to obtain continuous ground-based atmospheric measurements ideally suited to climate studies.

Researchers will use data from RACORO to validate ground-based measurements and support model simulations and studies of cloud processes.

Reference(s)

Working Group(s)

Cloud Properties



The Twin Otter takes off to test the onboard instruments for the RACORO field campaign that began in January 2009. Researchers are gathering data on the properties of certain low-level clouds. The data will be used to make climate model predictions more accurate.